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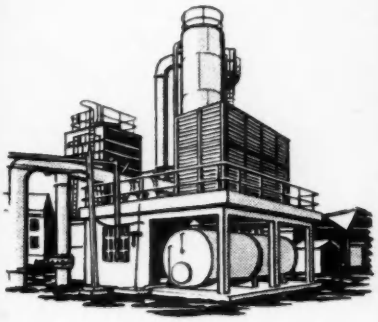

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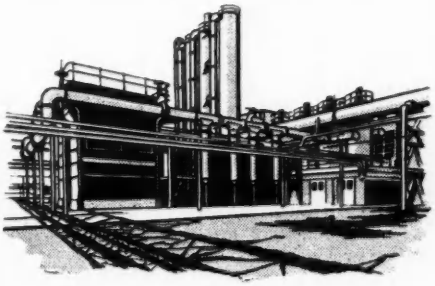

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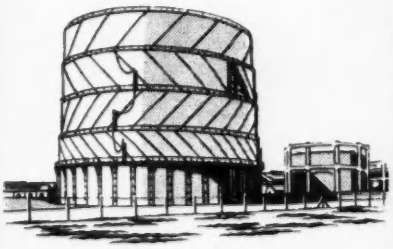

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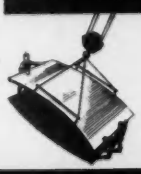

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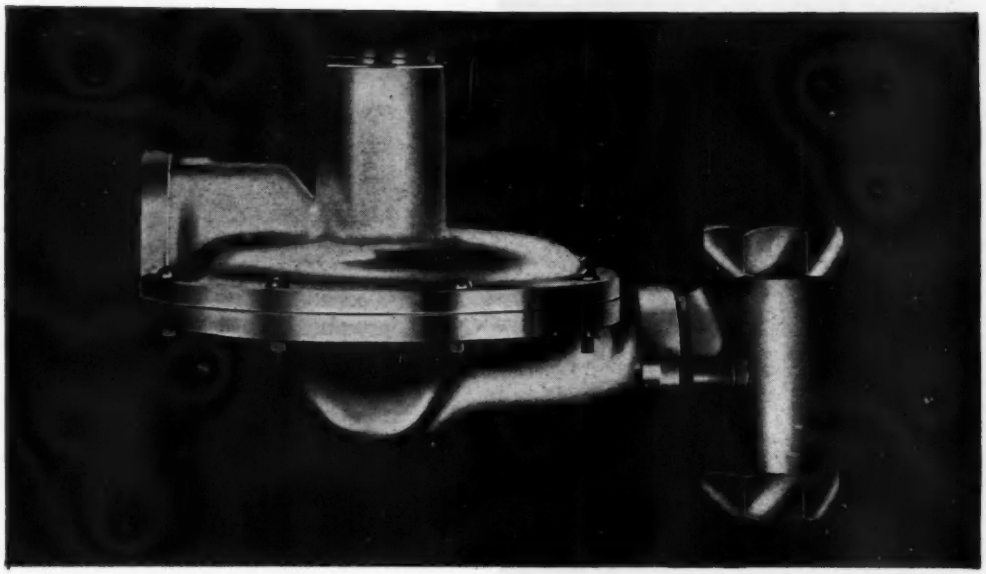

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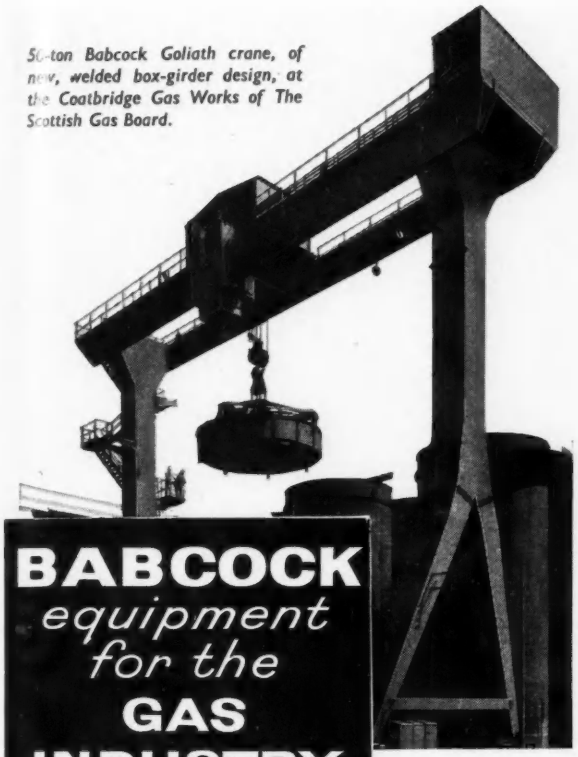

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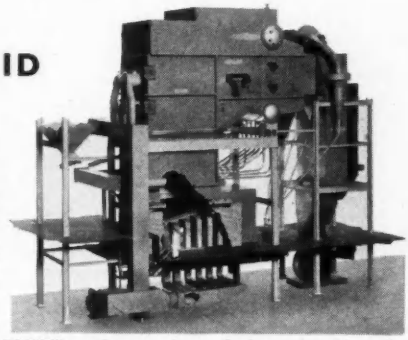

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Gas Journal

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WEDNESDAY, APRIL 20, 1960

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PUBLISHERS' NOTICE, SEE PAGE 33, APRIL 6, 1960

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Nadia Nerina, prima ballerina of the Royal Ballet, Giselle. Act 2.

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Gas Journal

COKE OVENS • BY-PRODUCTS • CHEMICALS

Mr. Hutchison surveys fuel and power

ANY opinions put forward by Mr. W. K. Hutchison, Deputy Chairman of the Gas Council, always demand attention, even when he is speaking in some capacity other than his official one. Last week he delivered his Presidential Address to the Institution of Chemical Engineers and chose as his subject the technological aspects of fuel and power, a subject of great interest to the gas industry. We are therefore publishing it in full in this week's issue.

In a survey from Mr. Hutchison of this kind we look for new facts which will help the gas industry to shape its future policy. Mr. Hutchison, with his combined capabilities as chemist, engineer and administrator, has proved himself well able to put forward the most up-to-date opinions, on the future tendencies of fuel demands, from the inside.

He starts by showing us how the present demand for energy first became an urgent problem and what effect it has had on an industrial nation. He says: 'The Industrial Revolution of the 19th century gave Britain a position of world leadership which was challenged only when larger countries came to appreciate the importance of harnessing all the resources of energy to aid the worker in his task of production.'

This latter point is fundamental to industrial progress and Mr. Hutchison shows the steady climb over the years in the thermal efficiency of the machines invented, developed and successfully applied to industrial processes. It is extremely hard to imagine today the limits imposed by the sources of power available before Watt successfully developed his steam engine.

Arkwright had built the first water-powered cotton mill in 1771 but before that power was generated by wind, small local water wheels, or muscle—either human or animal. In fact our original measurement of power was based on the conception of 'horse' power.

Until other prime movers were developed, it was impossible to imagine more complicated or larger machines, since enough power to drive them could not be concentrated at any one point. Newcome's 'steam engine' was grossly inefficient—less than 1% thermally efficient—and the power it made available was difficult to apply to any great variety of machines. Watt's crankshaft revolutionised the steam engine's application and made it available for a multitude of drives.

The age of energy from fuels had begun and the abundant resources of coal in Great Britain made available the thermal energy needed, labour was cheap and plentiful and the English appeared to be endowed with great skill in manufacture.

Although advances in thermal efficiency in steam production and utilisation went on apace, little thought was given to productivity, in fact as applied to industrial efficiency it might well appear as a word coined within the last 30 years. With the enormous increase in coal output from 70 mill. tons in 1860 to the peak of 290 mill. tons in 1913, little thought appears to have been given to increasing the weight of coal cut per man, by giving him 'more power to his elbow.' It was cheaper to employ more colliers working on the old stall system of cutting coal by hand than to devise the power-driven coal cutters and loaders that we know today.

The development of gas manufacture over the early years seems to have been directed with one aim, illumination, until it received a sharp set-back by the successful introduction of the electric lamp in 1882. It had to seek other markets and so successfully did it do this, that any loss in the lighting load was quickly made up and ultimately passed. An acute fuel shortage gave the industry an opportunity to increase its output and greatly encourage efficiency. With the extra funds available after nationalisation, modern works became a reality and developments brought about at the larger works became commonplace.

With the discovery of oil and the ease with which it and its products could be handled, a demand was

created for fuels which were less costly in labour to use, and although coal still remained the cheapest fuel available, there was a tendency to turn from its use for this very reason. We feel, however, that should means be found for handling solid fuel and disposing of the ash residue, simply and automatically, there is little doubt that its inherent low cost might easily cause a return in demand. This applies equally to gas manufacture. Although the tendency has been towards substituting oil for coal for gas making in the last few years, gas manufacture on a large scale for distribution by a national grid is likely to be from coal and not from oil. Mr. Hutchison's former board has been the pioneer in successfully exploiting means of gas making without coke production, since, as he says in his address, gas made by carbonisation can only be economically carried on as long as there is an assured market for coke. This is obvious, but can the carbonising plants all be put out of action at the right moment? Gas production he shows is largely a matter of reducing the carbon : hydrogen ratio, which may vary from 14 in bituminous coal, 6.5 in crude oil, 3.0 in natural gas to 2.5 in town gas. In carbonisation this reduction is accomplished by the production of coke. Complete gasification under pressure can make large volumes of gas available but a[t] [lo]w a calorific value and therefore needing enrichm[ent]. Carried out on a large enough scale with nation[al] distribution such processes might well supersede [car]bonising plant in areas of restricted coke sales.

The race for increased industrial production is [on] and the winner will be he who can cut his costs of production by high fuel efficiency and the econo[mic] use of labour. Anything which will assist in doing [this] will be in demand for a cheap easily-handled fuel is one such aid. Large centralised gas-making units [have] increasing importance to cost reductions in fuel transmission systems, and Mr. Hutchison shows that transmission charges per therm are lower for gas than electricity. Gas made at high pressure is cheaper than compressed gas, so provision of extensive underground storage reservoirs near centres of consumption should combine these gains with those from an increased manufacturing load factor. He concludes by suggesting that ' the long-term interests of economy and efficiency in energy supply can best be served by allowing each supplier to choose from among those materials available within the national economy those best suited to the special technologies at his command.'

Averting a smokeless fuels crisis

THE report of the committee on solid smokeless fuels, set up by the Minister of Power (then Lord Mills) a year ago, has been published—almost unnoticed. This lack of attention from the Press or public is not particularly surprising, since most of the committee's conclusions represent problems for those responsible for the production and distribution of solid fuel. Yet the committee, among the members of which are Sir Henry Jones, Chairman of the Gas Council, and Mr. A. H. A. Wynn, Member of the National Coal Board, has produced some remarkable tentative figures which indicate that but for the re-thinking that the report will surely cause, severe difficulties must lie ahead.

By 1965, which is as far forward as the committee has dared look, there will be an additional demand of 5½ mill. tons a year. Based on a Ministry of Power assessment, a breakdown of this demand is: Fuel for unimproved open grates, 1 mill. tons; for improved open grates, 4 mill. tons; and for closed appliances, ½ mill. tons. The estimated total requirement of 11½ mill. tons in 1965 is regarded as a reasonable maximum and depends for its achievement on the successful creation of smoke control areas, which in turn depends on adequate supplies of fuels acceptable to the public in quality and price.

The committee suggests that increased demand for specially-reactive fuels by 1965 may reach or exceed 2 mill. tons, ' though this can be no more than a guess,' and is particularly worried about uncertainty over the division of demand between fuels suitable for different categories of appliances.

Although improved grates—able to burn coke to British Standard specification and low volatile steam coals—are likely to be installed in greater numbers because of the grants towards cost of conversion, many of their owners are still likely to prefer reactive fuels. The committee, therefore, recommends increased emphasis on the virtues of closed and openable stoves in Government and local authority publicity and clean air education. There are, it states, rather obviously, ample supplies of fuel for these appliances. But the gas industry alone can make available the additional supply of about ¾ mill. tons a year of B.S. coke necessary to bring the total availability of fuels suitable for the improved grate to 4 mill. tons a year by 1965. The report adds: ' It might be fatal to the progress of clean air if people living in smoke control areas did not have reasonable freedom of choice in their selection of fuel and this freedom of choice could not exist if the grates installed in their homes were unable to burn coke and low volatile steam coals of suitable quality.'

But the most immediate problem is in the conclusion that ' on the basis of producers' present firm plans alone there might be a growing shortage of specially reactive fuels.' The fruition of producers' tentative plans, including the production of new fuels by the National Coal Board, could bring supply and demand into balance by the end of the period under review. All this is not so bad, because the committee considers that existing plant of the Gas Council and the N.C.B. is adequate to meet the situation.

It seems that the immediate result of the report might be that the eight gas boards not yet doing so will be asked to consider the feasibility of producing a solid fuel similar to Cleanglow.

Another matter that seems to call for immediate action is the evident dissatisfaction among distributors about information on smoke control plans. They obviously want to plan ahead for the necessary re-organisation and re-equipment of their businesses.

THE TECHNOLOGICAL APPROACH TO FUEL AND POWER PROBLEMS

By

W. K. Hutchison, C.B.E.

DEPUTY CHAIRMAN, THE GAS COUNCIL

THE Industrial Revolution of the 19th century gave to Britain a position of world leadership which was challenged only when other larger countries came to appreciate the importance of harnessing all their resources of energy to aid the worker in his task of production.

Abundant supplies of coal and the skill and enterprise which went into the transformation of coal into useful energy laid the foundation of that leadership. We should not, however, overlook the part played by our national character in exploiting world resources to provide the food and raw materials required by a highly industrialised community.

These have to be paid for by the export of the finished products of our industrial skill. The realisation of this fact, coming at a time when from being a net exporter of fuel we find it necessary to import an increasing proportion of what we need, should lead to an appreciation of the part that the technologist can play in applying fuel yet more effectively in the factory and the home.

Two significant events in the 18th century paved the way to the Industrial Revolution. In 1769 Watt published his first patent which was the precursor of many inventions and led to the ultimate realisation of the importance of the expansive properties of steam. From this time the growing efficiency of the steam engine released the necessary quantities of cheap power to the factories and workshops. Fig. 1 shows how successive inventions led to an improvement in efficiency from 2.7% before Watt's first invention to 36.5% in the most advanced designs today. Then in 1771 Arkwright founded his first large, waterwheel-driven, cotton mill. The transmission of power to a number of separate machines within a factory made possible the effective exploitation of steam as a source of energy. For more than a century the growth of population and the increasing standard of living were matched by the production of coal, with a substantial surplus which could be exported to pay for the raw materials which our economy demanded.

In contrast with the growing efficiency of power production, coal continued to be used most wastefully in many other applications, notably the domestic grate, the efficiency of which—of about 20%—can hardly have changed in 150 years.

An event occurred in 1812 which foreshadowed a new attitude towards the use of coal. An employee of Boulton and Watt, a Scot named Murdoch, had been experimenting for 30 years with the gas evolved when coal was heated in a closed retort, and the firm's factory at Soho was lighted by this means in 1808. The full development of his inventions became possible when the first public company, The Gas Light & Coke Company, was established by Royal Charter in 1812. Gas could now be produced centrally and distributed through pipes to the consumers. Continued improvements in efficiency have led to the position today where 90% of the heat content of the coal is realised in the various products of carbonisation.

The growing needs of the iron and steel industries led to a great increase in the demand for coke which was produced by partial combustion of coal in the wasteful beehive oven. The first byproduct coking oven was built in 1882 and from then on progress was rapid, so that today some 50 mill. tons of coal—one quarter of the national production—is carbonised in coke ovens and gasworks.

Carbonisation produces also 10 to 14 gal. of tar and 3 gal. of benzole from each ton of coal. For nearly 100 years these provided the sole sources of anthracene, naphthalene, toluene, and benzene on which the dyestuff industry was founded, and tar still remains a vital source of aromatic hydrocarbons. The tar industry made significant advances in the distillation and processing of liquid fuels, including the installation by Lennard in 1892 of the first

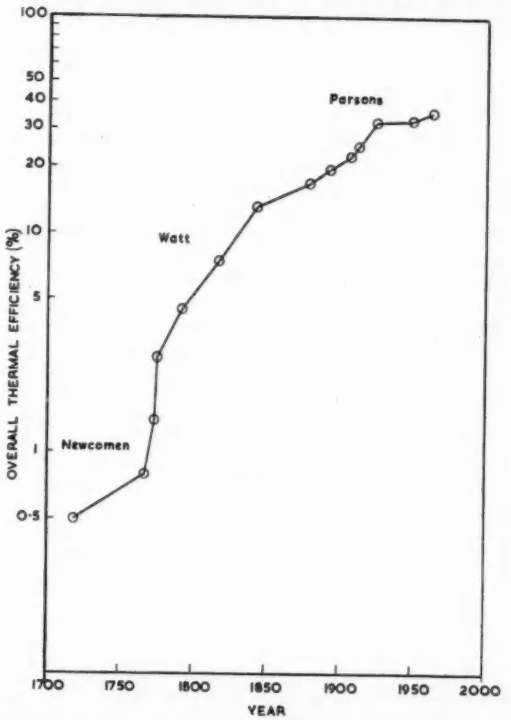


Fig. 1. Improvements in efficiency of steam engines.

Presidential address to the Institution of Chemical Engineers, April 12, 1960.

continuous pipe still, a development which is now universally applied in the oil industry.

The discovery of oil in Pennsylvania in 1859 marked the beginning of a new era. Used first for lighting, it was not long before further advances in the field of mechanical engineering had produced the internal combustion engine which during the next 100 years changed the whole pattern of our living. In his presidential address in 1957 Mr. Oriel described the technical advances by which the oil industry improved its efficiency and adapted its production methods to meet the changing demands. The convenience of liquid fuels led to the replacement of coal in many other applications where it had hitherto held a monopoly. Great Britain was denied a share of this new source of wealth, and following two major world wars and a decline in the production of, and demand for, coal, became a large importer of oil, a situation which seems likely to continue.

The supremacy of gas lighting was challenged in 1882 when the first public electricity supply company in England was formed to supply an area near Holborn. Successive improvements in the efficiency of generation and the invention of the incandescent lamp decided the battle in favour of electricity, and gas had to find new outlets in cooking and heating which, however, more than replaced the load it had lost. The Central Electricity Board, formed in 1926, established a network of new, efficient central power stations inter-connected by a national grid. This led to a continuing expansion of the use of electricity for light and power, and for many heating purposes from which it had hitherto been debarred by reason of cost. Fig. 2 shows the production of gas and electricity reduced to a common basis. The demand for electricity is expanding today by 7% per annum while the demand for gas is almost stationary. Electricity production uses 45 mill. tons of coal per annum, and the total quantity of coal processed to secondary sources of energy is 99 mill. tons per annum, which is half the country's coal consumption.

FUEL CRISIS AND ITS SEQUEL

Mr. Bevan, speaking at Blackpool on May, 24, 1945, said, 'This island is almost made of coal and surrounded by fish. Only an organising genius could produce a shortage of coal and fish at the same time.' But the causes which led up to a situation which by the spring of 1947 finally disorganised the economy and brought acute discomfort into our domestic life were clear enough. Production of coal had risen steadily from 70 mill. tons in 1860 to a peak of 290 mill. tons in 1913, and had then begun to decline as exports met growing competition. Fig 3, shows how in each of two world wars the loss of export trade and shortage of manpower cut production to new low levels, and in 1945 only 190 mill. tons were available for export and home consumption. Note that throughout the 100 years covered by this graph the output per man employed remained nearly constant, any improvements in methods being absorbed by the need to grant more reasonable working hours to the men. Only now is productivity beginning to increase.

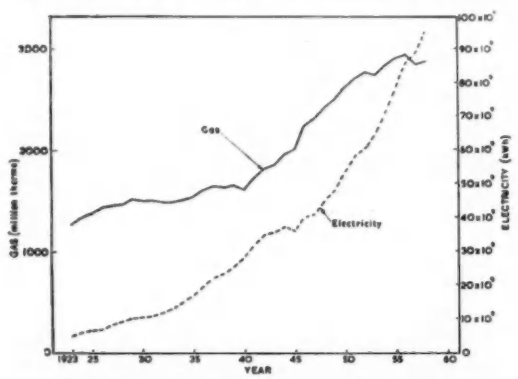


Fig. 2. Production of gas and electricity.

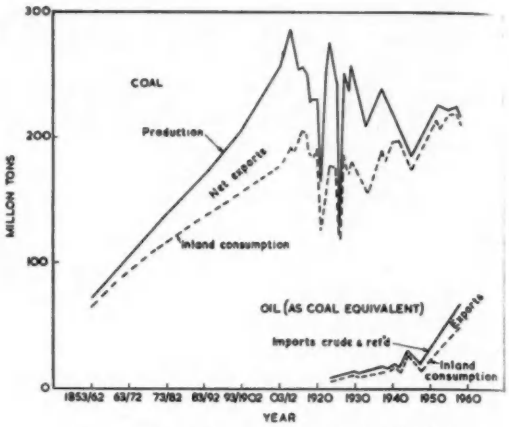


Fig. 3. Coal and oil supplies 1850 to 1958.

Recovery after the end of the war had to await the recruiting of more men to the mines. Meanwhile with the release of manpower from the forces to industry, the economy increased faster than the expansion of output of the mines. After several years of anxiety the crisis came in the severe winter of 1946/7 when coal stocks were exhausted and the power stations and gasworks were unable to meet the demand thrown on them, while unemployment rose to a figure of nearly 2 mill.

In the inquests that followed, it was apparent that production of coal was unlikely to increase to meet the needs of an expanding economy with full employment. Oil refineries were to be established on a large scale in this country with the object of producing residual oil to supplement coal as a fuel, and high priority was granted to the development of nuclear fuel as a source of energy. We had to import if we were to prosper, but the question was, how much?

The economy of Western Europe was experiencing the same difficulties as those of the United Kingdom, and in 1954 the Organisation for European Economic Co-operation (O.E.E.C.) in Paris set up a study group under the chairmanship of Sir Harold Hartley to examine the problem of energy requirements.

CHANGING PATTERN

The Hartley Commission reported in the following year. The report describes the changing pattern where, from being a net exporter in 1929, it had become necessary by 1955 to import 30% of the energy requirements of Western Europe. The Commission concluded that the maintenance and improvement of the standard of living of a rising population would require a continuous increase in the consumption of energy. Taking account, *inter alia*, of an expected increase in the efficiency of utilisation, they estimated that the total energy requirement would increase from 730 mill. tons of coal equivalent in 1955 to 840 mill. tons in 1960 and 1,200 mill. tons in 1975. After allowing for the expected level of indigenous production the forecast was that imports would rise from the level of 146 mill. tons in 1955 to 195 mill. tons in 1960, and 445 mill. tons in 1975. Imports of coal or oil into the United Kingdom were estimated at 70 mill. tons in 1960 and 100 mill. tons in 1975.

Member countries were recommended to develop all indigenous forms of energy and it was emphasised that coal would be the mainstay of the European economy for many years to come. Nuclear energy was not expected to provide more than 8% of the energy needed as far ahead as 1975, and it would be necessary to import oil in increasing quantity to bridge the gap. Special importance was attached to the upgrading of primary into secondary forms of energy, such as gas and electricity, and to the saving possible by utilising energy more efficiently in industry and the home.

Events of the next five years seemed at first to throw doubt on the Commission's findings. The period 1948-1956 had been one of rapid expansion, during which consumption of primary fuels rose by 260 mill. tons of coal equivalent, or 47%, contributed to about equally by coal and oil.

This phase was accompanied by inflation in varying degrees and was followed by a period during which the control of the inflationary tendency had led to a moderate recession, one consequence of which was a reduction of 6 mill. tons of coal equivalent in the consumption of energy between 1956 and 1958.

The seller's market for fuel became a buyer's market and consumer preference declared itself in a fall of consumption of coal of 48 mill. tons, while all other kinds of energy increased, including oil, of which the additional consumption was 30 mill. tons of coal equivalent. Production of coal declined and stocks reached 67 mill. tons in the third quarter of 1959 (of which 27 mill. tons were in the United Kingdom).

ECONOMY TO EXPAND

These factors have been described and examined critically by a second Commission of the O.E.E.C. set up in 1956 under the chairmanship of Professor Robinson, the report of which has just been published. The Commission considers that the European economy is likely to expand again at the rate in the period immediately before the recession, and has confirmed the long term estimate of the Hartley Commission (Fig. 4). Noting that periods of moderate recession alternate with periods of rapid advance they think that it would be unfortunate if long term measures were to be curtailed by short term doubts. Special attention is drawn to the difficulty of the coal industry where the effects of any recession are felt first and most severely. In the Commission's words—'The future of coal very largely depends on an increased transformation into secondary forms of energy, easier to distribute and more convenient to use.'

If we accept, as I think we must, the conclusion reached by these two Commissions, that the future prosperity and standard of living of Western Europe require the importation of increasing quantities of fuel (and these conclusions are equally true of the economy of the United Kingdom), the problem that remains is how to apply the different energy sources available to us most efficiently.

The aim should be the best use of all and each of the fuels available—indigenous coal, imported oil, and imported natural gas—within the total that the economy can afford and having regard to definite consumer preference for a fuel that is clean and convenient and efficient in use.

Methane or natural gas was not considered in connection with the British fuel economy until the successful trials of the Methane Pioneer showed that the technical problems of refrigerating, storing, and transporting liquid methane by sea had been overcome. Methane is a very satisfactory fuel to handle and distribute, and estimated

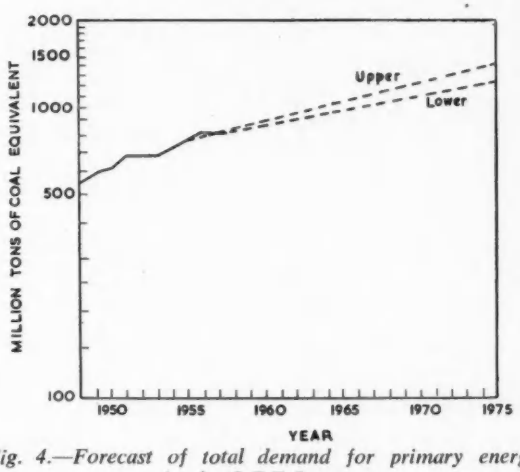


Fig. 4.—Forecast of total demand for primary energy in the O.E.E.C. area.

world reserves of natural gas are equivalent to 40% of the total reserves of oil and gas.

Hydro-electric power and the marginal fuels, lignite and peat, can only be of minor importance in Britain, and oil and gas are unlikely to be found in significant quantities. Nuclear energy depends at present on a relatively inefficient thermal cycle and the cost is unlikely to be fully competitive with thermal energy for some years. The nuclear fuel has to be imported, and the Robinson Commission has pointed out that an active nuclear policy will secure a relatively small saving in foreign exchange compared with the importation of traditional fuels of equal value. This conclusion may, however, be modified by technological improvements and by new discoveries of science.

It is now appropriate to examine the means whereby primary fuels are converted into secondary forms of energy.

Oil refineries operate at efficiencies between 91 and 95%, depending on the complexity of the process involved; the capital cost can be estimated as of the order of £5 per therm of daily output on a scale of 5 mill. tons crude oil per year. Improvements in refinery practice have led to a remarkable increase in the use of oil for domestic heating in spite of some inconvenience in handling and storing a liquid fuel in the home.

ELECTRICITY GENERATION

Electricity is outstanding in convenience and efficiency in use. Table 1, from a recent article by F. H. S. Brown, shows how the more significant advances in power generation in recent years have been in the reduction of capital cost through simplification of design and increase in unit size[1]. Generation efficiency seems to be nearing the limit that the classical steam cycle will allow, and further improvements may have to await the successful conversion of thermal into electrical energy by direct methods such as the fuel cell and the magneto-hydrodynamic generator.

Meanwhile thermal power stations have the great advantage of being able to use almost any source of primary fuel with equal facility, and the relative inefficiency of conversion is compensated for by high efficiency in use.

Next in convenience is gas, except for transport, for which liquid fuels are uniquely suited. The extraordinary growth of gas supply in the United States of America and now in Russia shows what can happen when natural gas is

TABLE I—*Efficiency and Cost of Generating Stations*

Unit size (MW) (installed)	Steam pressure and temperature (p.s.i.) (°F)	Year first commissioned	Thermal efficiency (%)	Capital cost of complete station (£ per kW sent out)
30	600/ 850	1948	26	67
60	900/ 900	1950	29	57
100	1500/1050	1956	32	58
100*	1500/ 975/ 950	1957	33	59
120*	1500/1000/1000	1958	34	53
200*	2350/1050/1000	1959	36	50
275*	2300/1050/1050	1962	36	41
550*	2300/1050/1050	1963	36·5	39

* Reheat.

freely available. Little progress had been made while production was tied to coal and coke. Gas supply in Great Britain has reached a stage where further progress requires new technological advances if full advantage is to be taken of local distribution systems that can bring thermal energy cheaply to every urban house and factory.

The routes by which town gas can be produced from the fuels available are shown in Fig. 5, and against each has been set an estimate of the overall efficiency of the process. The basic operation involved in the conversion of primary fuels to gas can be described in terms of the carbon : hydrogen ratio as follows:

	Bituminous coal	Crude oil	Natural gas	Town gas
C/H ratio	14—18	6.5	3.0	2.5

A further qualification of town gas is that it must contain about 50% by volume of free hydrogen in order to possess the characteristic high flame speed for which all existing appliances have been designed, and the calorific value and specific gravity must be closely controlled.

In the carbonisation of coal the adjustment of C/H ratio is through the production of a coke of very high C/H ratio. After allowing for what is used to heat the retorts, there remains for sale the equivalent of 2 therms for each therm of gas, and only so far as a market exists for the coke will this traditional method of gas manufacture be practised in future. The expected expansion in the iron and steel industry should lead to some increase in gas available from this sector of the carbonising industry.

In gasification processes carbon is converted to hydrogen and carbon monoxide by reaction with steam. More steam is used to convert the carbon monoxide to carbon dioxide with the production of hydrogen. Some or all of the carbon dioxide is then eliminated from the system by physical or chemical means. In intermittent processes carbon dioxide is eliminated in the 'blow' period.

If no other factors were involved the choice of raw materials would clearly fall on those which most closely approach the C/H ratio of town gas. Thus the reforming of methane is an efficient and simple operation and any carbon dioxide produced can be carried in the finished gas as ballast to give it the required specific gravity. Next in preference would be the lighter products of oil refining, and large installations are now at work or under construction for the production of town gas from refinery gas or other oil products. Only when these sources are exhausted would it be reasonable to turn to bituminous coal with its much higher C/H ratio.

Strategic reasons and the desire to maintain an outlet for coal will certainly weigh heavily against technological judgment, and it is significant that even in the United States a considerable research and development effort continues to be applied to the conversion of bituminous coal into liquid fuel and gas.

The only acceptable method for gasifying coal at present is the Lurgi process in which sized small coal is gasified under pressure with steam and oxygen in a continuous counter-current manner. The gas produced must be enriched with a hydrocarbon from an external source, such as methane or propane-butane (l.p.g.) in the proportion of one-half to one-third of the thermal content of the finished gas.

Much more research will be needed before a fully satisfactory, all-coal process is developed, one possible route being through the reaction of hydrogen with raw coal to give an increased production of rich gas. Meanwhile, it will be necessary, as I have suggested, to give consideration to every source of hydrocarbon, whether imported or indigenous, in order to make progress at all.

A study has been made at a Lurgi plant at an East Midlands coalfield rated at 105 mill. cu.ft. per day to supply a national grid, the lean gas being enriched by l.p.g. Debiting the latter with refinery efficiency at 91% and capital cost at the refinery rate of £5 per therm, the overall plant efficiency is found to be 73% and the capital cost £34 per therm of daily output, or in its electrical equivalent, £27 per kW. A direct comparison with electricity generation cannot be made without taking into account the effect of the different system load factor.

Gasification plants are relatively new and a sustained technological attack might well lead to further reduction in capital cost, even if not so striking as those achieved in electricity generation.

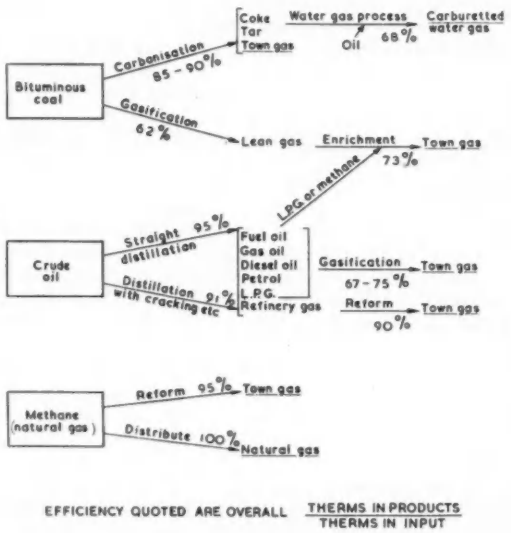
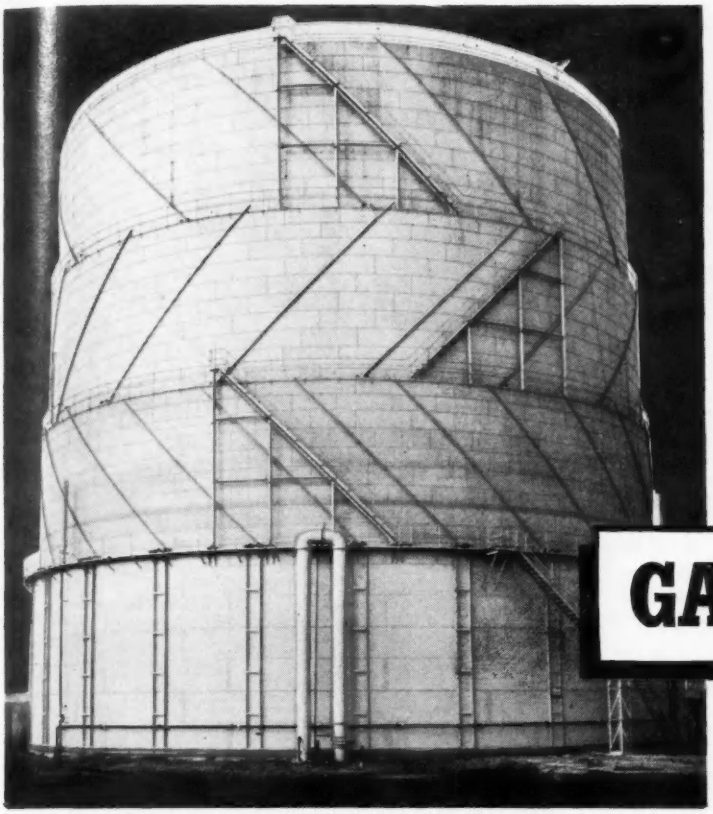


Fig. 5. Routes for the production of gas.

TRANSPORT AND STORAGE

The fuel and power industries are increasingly conscious that the cost of distribution of their products tends to absorb some of the economies made possible by large central installations. Transport of coal as a water-borne slurry is now a possibility and oil pipe-lines have been constructed to bring crude oil from the new larger tanker terminals on the west coast to refineries further east. Pipelines are being planned also to bring the products of refineries to the centres of consumption. Storage of solid and liquid fuels offers no special problems, the amount and location being determined by seasonal requirement and the



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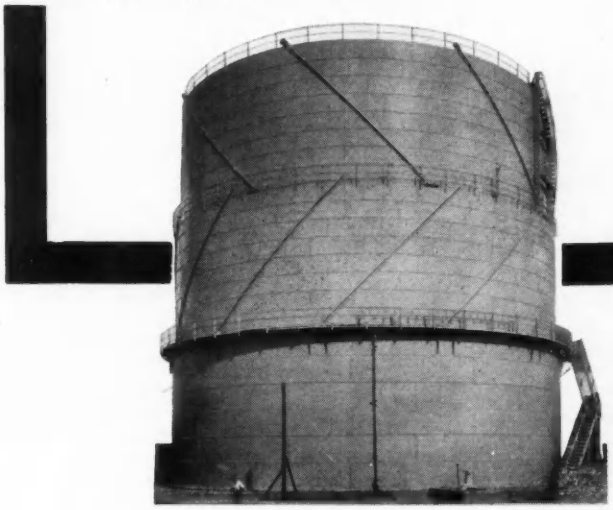
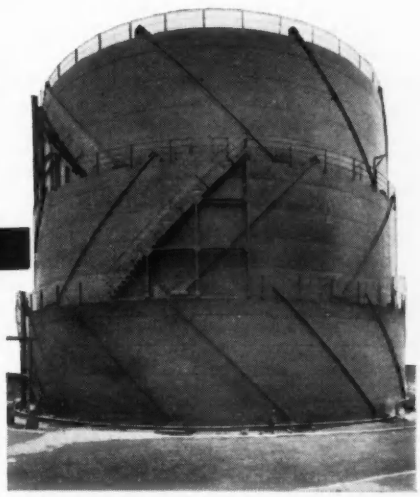


250,000 cu. ft. capacity Spirally Guided Gasholder in Steel Tank, for the South Western Gas Board.



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necessity to provide a buffer against fluctuations in the demand for special products.

No satisfactory method of storing electricity, as such, in the context of a national supply has yet been discovered, and the capacity of generating plant and the associated transmission systems must be adequate to meet the maximum demand. The whole system has to be operated to accommodate both hourly variations during the day, and seasonal variations due to weather and other factors. The present system load factor of 45% may deteriorate still further due to the increasing popularity of this highly refined energy source in the domestic heating field.

So long as gas production involved coke production, any advantage resulting from centralised production at the coal-field was absorbed by the cost of moving coke to the centres of consumption. Gasification plants logically sited near oil refineries or at coalfields will require a transmission system similar to the electricity grid, feeding the local integrated distribution systems which already exist. The gas industry is fortunate in having gasholder capacity equivalent to 60% of the maximum day which serves to take up hourly variations in demand, with some reserve to absorb the weekly cycle of fluctuations. The replacement cost of this storage would be £10 per therm of daily installed capacity. Seasonal variations remain, as a result of which an over-all factor of 75% is being experienced which may deteriorate with an extension of the use of gas for domestic heating.

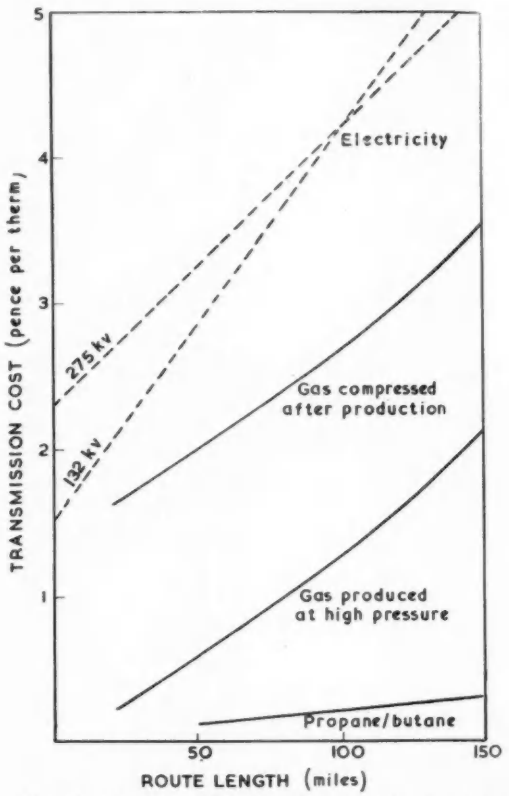
Anticipating this, the Gas Council is conducting a search for underground structures suitable for containing large volumes of gas. The American solution was to use exhausted gas wells, but other structures not now containing gas may provide the necessary anticlinal closure over rock- or sand of the requisite porosity. Several structures of this kind are in use in Europe and there are good indications they will become available in Britain in capacities from 10,000 mill. cu.ft. upwards. A few of these connected to a national grid would establish a constant rating for the production plants, and if situated near the centres of consumption would relieve the transmission system also of seasonal variation.

Comparative costs of transmitting energy in the form of electricity and gas have been discussed by A. H. Wynn[2] in a recent publication from which Fig. 6 is taken. Both are assessed on the basis of a 50% load factor and reveal a very great advantage in favour of gas produced under pressure. A load factor of 75% might be more appropriate for gas in view of its thermal storage capacity and would reduce the figures shown by a further .35d. per therm. An additional curve has been introduced to show the still lower cost of transmitting fuel as liquid—in this case liquefied petroleum gas (l.p.g.)—which might be required for enrichment of gas from the Lurgi process.[3]

It is now possible to summarise in Table 2 the factors

TABLE 2—*Efficiency Factors in the Processing of Fuels*

	Oil refinery	Gas production	Electricity generation
Scale of operation			
Therms per day	5 mill.	·5 mill.	·44 mill.
Electrical units	—	(600 MW)	550 MW
Process efficiency	91–95%	73%	36·5%
System load factor	—	75%	45%
		per therm	per therm
Capital cost	—	£34	£49
Adjusted for load factor inclusive of storage	£5	£59	£104
Cost of transmission 100 miles at 50% load factor	(l.p.g. ·32d.)	1·3d.	4·1d.



Quantity of energy ; 360 MW or 60 mill. cu. ft. of gas a day
Load factor ; 50%
Inlet gas pressure ; 25 atmospheres.

Fig. 6. Comparative costs of transmission of electricity and gas.

which distinguish three methods of processing fuels, namely, oil refining, gas production by the Lurgi process with l.p.g. enrichment, and electricity generation at a thermal power station.

No great accuracy is claimed for these figures, nor have I attempted to assess the important factors of raw material cost and cost of local distribution. What does emerge is that the different forms of energy processing have quite different characteristics, all of which should be exploited on their own merits in the context of a national fuel supply system.

'Our aim must be a cheap and abundant supply of fuel —our policy is to obtain it by proper freedom of choice for the user and competition between suppliers.' These words used by Mr. Maudling in one of the frequent fuel debates in Parliament defined the consumer's right to choose what he thinks best. Nothing was said about the supplier on whom it has been thought necessary from time to time to exercise restraints due to economic and political factors. I suggest that the long term interests of economy and efficiency in energy supply can best be served by allowing each supplier to choose from among the raw materials available within the national economy those best suited to the special technologies at his command.

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[1] F. H. S. Brown, 'Costs Cut at the Power Station,' *The Times*, Feb. 9, 1960.
[2] A. H. Wynn, Tenth W. M. Thornton Lecture, August 1958.
[3] Dr. J. Burns, private communication.

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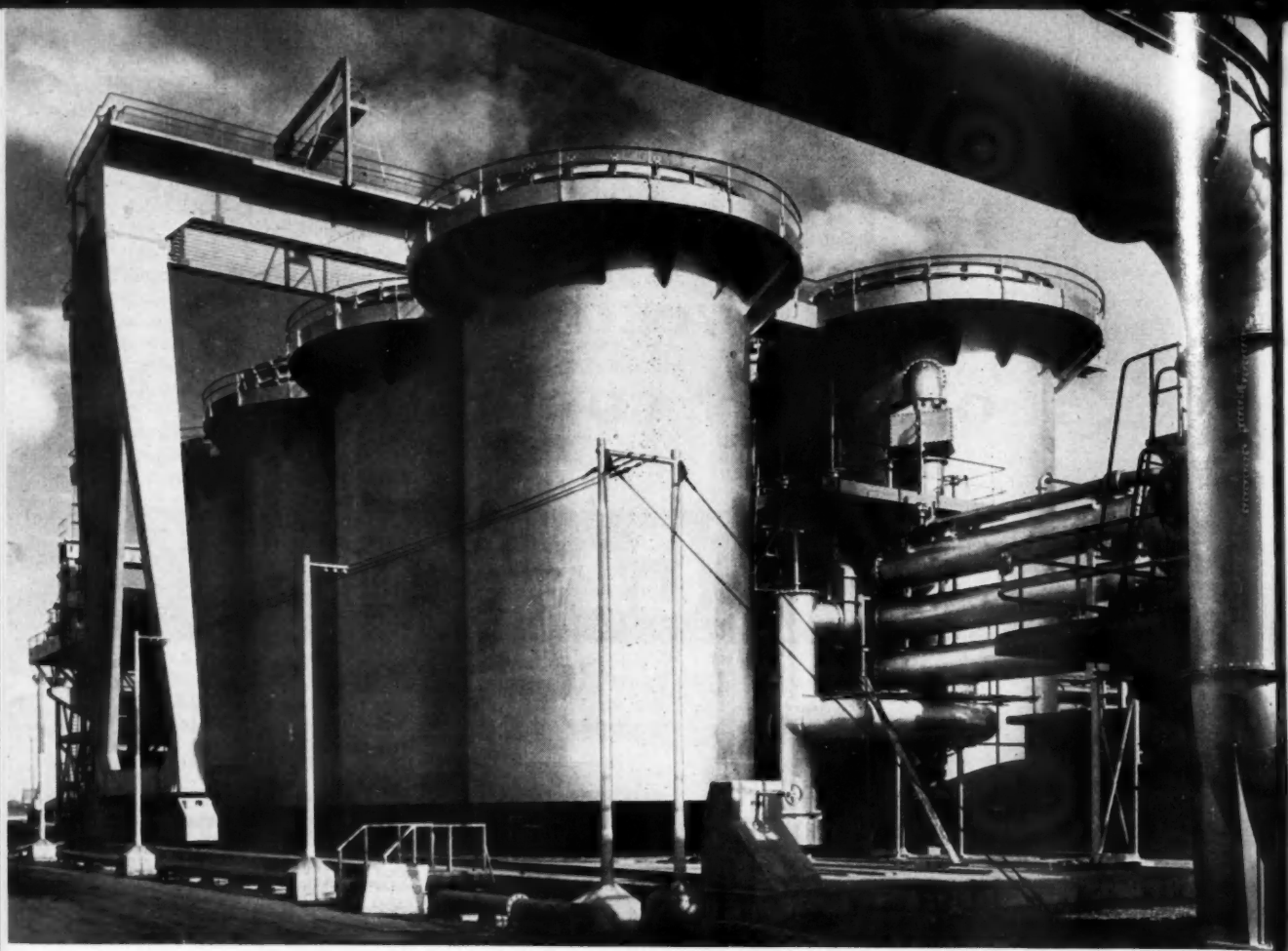

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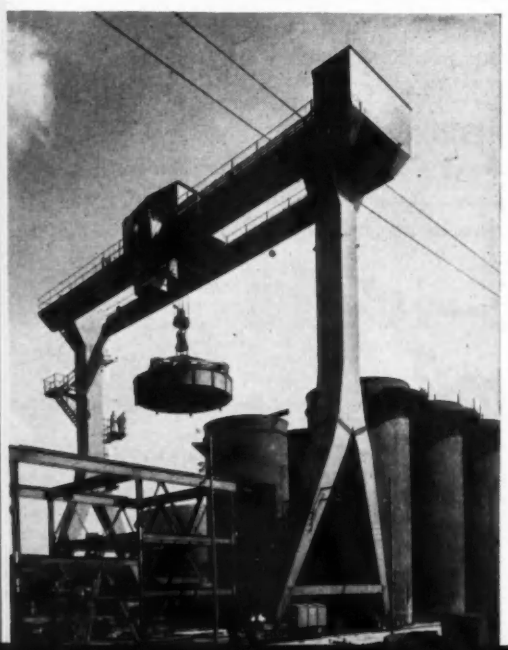

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From a paper to the Manchester Junior Association of Gas Engineers.

Additional uses for a double diaphragm type of governor

By L. DAVY,
STUDENT APPRENTICE, MERSEY GROUP,
NORTH WESTERN GAS BOARD.

GAS governors have filled the rôle of pressure regulators since the earliest days of the gas industry. Converting the different pressures thrown by the various lifts of a gasholder to a uniform delivery pressure, the need to compensate for the varying demand loads and their effect on this pressure in the distribution system, are problems that have always had to be overcome. So much so, that the term governor has now become associated with pressure regulation. With the advent of the diaphragm type of governor, however, a completely new field of application has opened up.

The adaptability of this type of governor was further increased by the isolation of the main—or operating—diaphragm from the valve chamber with a sealing diaphragm, which allowed the impulse pipe to be connected to some point remote from the governor and not, as hitherto, an integral part of it.

The strength of the diaphragms and the materials used in their construction could also be linked with the pressures to which they would be subjected. This contributed in no small degree to the usefulness of the basic design of the governor.

It is the intention of this paper to indicate a few of the many uses to which a double diaphragm governor can be put.

Pressure regulator

The diaphragm type of governor is familiar in the rôle of pressure regulator, and installed for this purpose in its simplest form, the impulse pipe is taken from the outlet main at a point adjacent to the governor while the space above the diaphragm is vented to atmosphere. Dead weight loading is applied to the diaphragm plate and acts through the spindle to the valves, so that any tendency for reduction in pressure at the impulse point is immediately compensated for by the base loading weight. Conversely, as the demand increases any tendency for increase in pressure reacts against the pressure plate, and overcomes the loading weight, closing the valves until a state of pressure equilibrium is again attained.

Station governors and those supplying larger sections of the district quite often need to cater for variations in pressure at peak demands and off-peak loads and this can be carried out (particularly with station governors) by an attendant adding or subtracting weights at the appropriate times. It is far more convenient, however, and less subject to error if this operation is carried out automatically; it can be achieved by a system of auxiliary governors and clock controls. The various items needed in such an auxiliary governor system are:

1. A breakdown governor, the purpose of which is to supply gas at a pressure sufficient for the operation of the various pilot governors in the line. This governor must, of necessity, throw a pressure in excess of the outlet pressure and is equipped to do so by gas loading from the outlet main. This ensures that a pressure greater than the outlet pressure equivalent to the base loading will always prevail, regardless of the outlet main pressure existent at any time.

2. A patent inspirator designed on the venturi principal, the throat of which is connected as the impulse to the main governor. Thus a flow through the inspirator will cause a reduction of pressure at the throat and also under the main diaphragm. In this way it affects the operation of the main governor.

3. Three pilot governors, two of which are clock controlled and the third set to the highest pressure impulsed directly. During the operating period of the pilot governor the clock control allows the outlet main pressure to be in contact with the pilot governor, which in turn controls the flow of gas through the inspirator. Thus, effective control of the main governor is achieved.

During the *off* period of that particular pilot governor, the clock control cuts off the impulse from the outlet main and vents the pilot to atmosphere. With the lowest pressure pilot governor working, the other pilot governors are inoperative by virtue of their base loading. With the middle pressure operative, the lower pressure pilot is out of action through its clock control and the higher pressure pilot by its base loading. With the highest pressure operative the lower pressures are put out of action by their clock controls.

There are other methods of clock controlled pressures, some with a single cam-operated pilot governor. The position of the various pilot governors in the above system is also open to question, but it is not intended to enter into details in this paper.

Varied adaptations

So far, the double diaphragm governor has been considered purely as a pressure regulator, but its versatility is more apparent when it is fully utilised in remotely controlled distribution stations. Here its adaptations are many and varied and this aspect will be discussed now.

In the small distribution station, the first thing needed is some form of remotely controlled valve, or a volumetric governor. The latter is fundamentally the same basic form of governor as referred to above. The valves are reversed so that they are now down to close and there is an impulse connection to both the top and bottom chamber of the

main diaphragm. Control is effected by a volumetric pilot governor in the auxiliary line, which maintains a differential pressure across an orifice plate sited on the outlet of the main governor. The volume of gas passing will be a mathematical function of the differential pressure across the orifice, and so volumetric control can be achieved by including a variety of items in the auxiliary line, such as holder cut-offs, l.p. inlet cut-offs, clock controlled volumetric pilots, etc. The volumetric governing can be made either fully or partially automatic.

Remotely controlled valve

When it is to operate as a remotely controlled valve, however, the type of control desired will determine the necessary equipment to operate the valve. If it is convenient to operate it with the valve either fully open or closed, the method employed may be by a magnetic valve operated through a system of relays from the control room. Variation of this, such as a three-way cock or poppet valve gear operated by a small electric motor, may also be used. All of these auxiliary items are fitted in the impulse pipe of the main governor. When the impulse is taken from the inlet main, pressure failure would cause the valve to close. If the impulse were taken from the outlet the result would be different.

The system of control may require that the valve be controlled throughout its travel from closed to fully open. This can be achieved through a cam operated by a small electric motor controlled through a relay system. The wider front of the cam presses down the valve rod and opens the valves.

The pressure under the diaphragm plate keeps the cam follower in contact with the cam and when closing, the hook formed on the cam rides under the cam follower to ensure a tight shut-off. Stops are fitted at either end of the cam travel to stop the motor, and prevent an overrun.

Where a booster has been installed in the type of small distribution station referred to above, the booster bypass may be a standard type of governor weighted to open when the booster stops and the pressure in the main falls below that to which it is set, *i.e.*, holder pressure. It may be fitted with an auxiliary line to protect the main diaphragm, but this is dependent on the pressure rise of the booster.

Safety governors

The safety governors to be found in such stations are also standard and are weighted to deliver gas at a pressure slightly below the normal district pressure. They come into operation in the event of a plant failure causing low pressure in the district main and would be big enough to maintain that slightly reduced pressure until normal conditions have been restored.

Finally, the double diaphragm governor may be used as a holder cut-off valve. In a two-holder station, for instance, one holder may throw higher presssures at each lift than the other, so it would be necessary to prevent (a) the highest pressure thrown by the heavier holder from causing the lighter holder to blow and (b) gas being taken into the station until the heavier holder was overfilled. It may also be desirable to prevent one, or both, of these holders from completely grounding. A standard double diaphragm governor may be used as a holder cut-off valve to prevent the holder overfilling. The governor is impulsed under the main diaphragm in the normal manner from a point on the district side of the main.

A second impulse pipe is taken from the district side through a trip-operated three-way cock or a poppet valve gear fixed on the holder, back to the normal vent to atmosphere point on the governor. This makes it possible to equalise the pressure on both sides of the main diaphragm, or, to vent the top side to atmosphere. The governor is weighted to a pressure below that thrown by the holder's top lift and the trip is fixed to the holder in such a manner as to operate the three-way cock—or poppet gear—when the maximum volume of stock has been reached. In this position the three-way cock—or poppet gear—is actuated to prevent the inlet gas pressure coming in contact with the top side of the diaphragm and at the same time venting the top chamber to atmosphere.

When the pressure in the inlet main or common main to both holders is higher than that to which the holder valve is weighted, the valves will close and prevent gas entering the holder until the pressure in the main falls to allow the valves to open and take gas out. When the trip is again operated on the downward path of the holder, the impulse is reconnected to the top chamber of the governor; the pressure is now equalised on both sides and the governor falls open under the influence of its loading. Gas can now enter or be taken from the holder dependent upon the pressure in the main.

Difference arrangement

When it is desirable to both prevent the holder overfilling and grounding a slightly different arrangement is necessary. The valves and valve seats are reversed to be down to close and the hanging parts are counterbalanced to leave a closing force equivalent to something like 2/10 in. w.g. A four-way cock is incorporated in the two impulse lines one of which is taken from the main on each side of the valve to the top and bottom chambers of the main diaphragm. The three-way cock—or poppet valve gear—is between the four-way cock and the top chamber of the governor. The trip of the four-way cock is fixed to the holder at a point where it will operate when the holder is at or near the middle of its travel. Thus, with the holder from half full to full, pressure from the main between the holder and the cut-off valve is in contact with the underside of the main diaphragm. The pressure from the district main is connected to the three-way cock and the top chamber is vented to atmosphere; the valves are thus held open by the holder pressure. Gas can then be transferred in or out of the holder. On reaching the optimum capacity of the holder, the three-way cock is tripped to bring pressure from the main to bear on the cut-off valve, and with the 2/10-in. w.g. closing force, together with the district pressure being higher than the holder pressure, the cut-off valve closes and so prevents more gas entering the holder. It will, however, allow the gas to flow out of the holder when the district main pressure falls below that thrown by the holder.

Four-way cock

At about the mid position of the holder the four-way cock is operated to put district pressure under the diaphragm and transfer holder pressure to the three-way cock, above the diaphragm being vented to atmosphere. Gas can still flow into, or be taken out of the holder stock. When the holders reach the minimum stock position the three-way cock is again tripped and holder pressure is brought to the top chamber of the governor. Thus with holder pressures greater than the district main pressure the valves are kept closed by the holder, and gas is prevented from being taken out of the holder stock. But when the district pressure increases to above that thrown by the holder, the valves open and allow gas to flow into stock.

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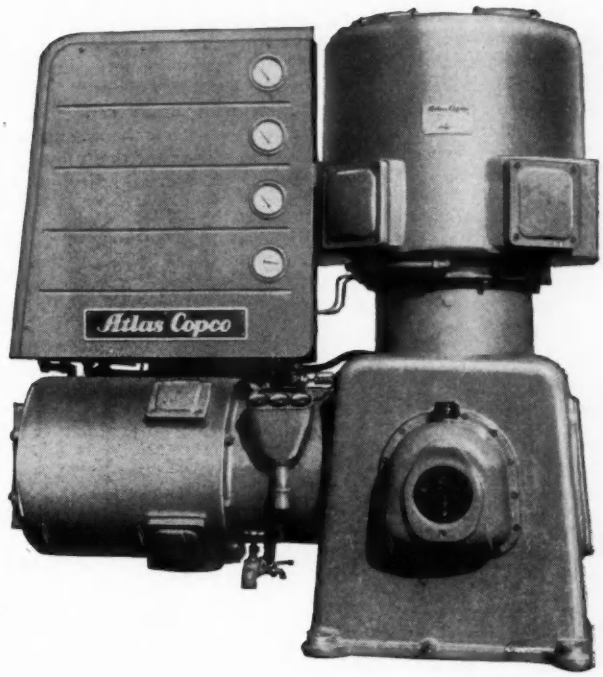

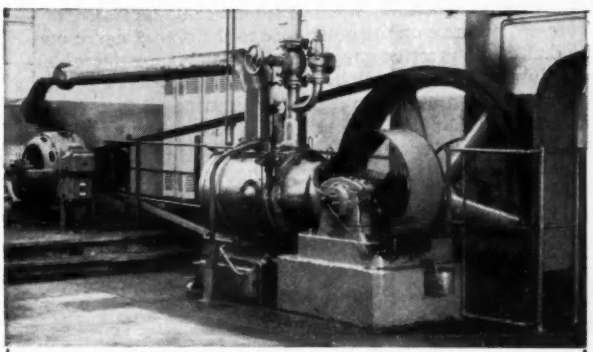

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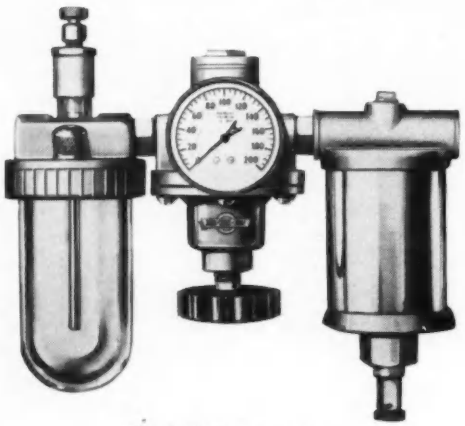

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For airline systems where a pressure reducing valve or other form of pressure control is already installed, the Controlube Minor, which comprises a moisture separator and a lubricator, can be supplied.—*B.E.N. Patents Ltd.*

New tractor shovel

A NEW 1½ cu. yard HD.6G tractor shovel with an Allis-Chalmers 79.5 h.p. four-cycle diesel engine, which produces a 16,670-lb. drawbar pull, is now in production at the company's Illinois works. Four forward speeds from 1.5 to 5.5 m.p.h. and two reverse speeds of 2.0 and 4.1 m.p.h. can be selected with the single lever located within easy and natural reach of the operator.

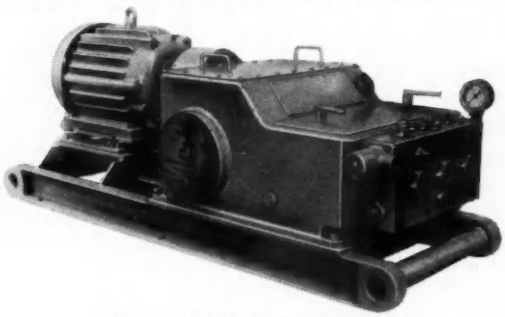
Dumping of the new unit is over 9 ft., and it has ample reach to get bucket loads out to the centre of high-sided trucks. The new curved bottom bucket tips back 40 degrees at ground level, with a 21,500 lb. break-out force at the cutting edge, which is 500 lb. greater than the weight of the machine itself. Solid steel booms and link[illegible] are fully 'in-line' with the lift and dump cylinders wh[illegible] are positioned well away from the bucket and from di[illegible] and rocks. Wide spaced boom pivots are straddle-m[illegible]nted on the double-walled shovel side-frames for excep[illegible]onal stability and strength. Long six-roller tracks dist[illegible]bute tractor and load weight to give the HD.6G the ba[illegible]nce necessary for safe handling of big loads at high-prod[illegible]ion speeds. Shovel functions can be precisely controlled with the hydraulic system which incorporates a spe[illegible]ally designed, heavy-duty gear-type pump.

Hydraulic lines and hoses for the entire unit are equi[illegible]ped with re-useable fittings for simplified and low cost rep[illegible]ce-ment. New sand deflecting pusher type fan gives lo[illegible]ger life to both fan and radiator core. Fan belts are eas[illegible] to replace because there is no need to disconnect the hydr[illegible]ulic pump and connections. The fan is driven from a do[illegible]ble sheave on the timing gear shaft rather than the crankshaft. A wide variety of versatile attachments which can be easily mounted quickly permits the HD.6G to do special jobs faster, at lower cost. Rear-mounted equipment includes hydraulic ripper and a backhoe. Front-mounted matched attachments include a rock bucket, rock fork, light materials bucket, lift tongs and lift forks, crane hook and straight and angling type dozers.

Standard equipment includes: 1½ cu. yard general purpose bucket; chrome plated rods, lift and dump cylinders; heavy-duty hinged wrap-around radiator guard; 13-in. semi grouser shoes; heavy-duty front idlers. heavy-duty positive seal truck wheels, front idlers and support rollers; full width crankcase guard; heavy-duty track guiding truck wheel guards; pusher type fan; muffler; 24 volt electric starting and lighting equipment; fuel and lubrication oil pressure, temperature and ammeter gauges; long track rigid truck frames.—*Mackay Industrial Equipment Ltd.*

Hydraulic pump

JOSEPH EVANS & SONS (WOLVERHAMPTON) LTD. celebrate their 150th anniversary with the introduction of a new worm-driven hydraulic pump. To be known as the 853W/M, the new pump, which has low



The 853 W/M hydraulic pump.

plunger speeds, is of compact all-steel construction and has been designed to occupy a minimum of space.

The motor, a standard foot-mounted type, is accommodated on a fabricated base plate with skids ends and welded-in tubes for easy handling. Overall weight has been reduced to a minimum to further facilitate handling and special attention has been paid in its design and construction to simplify operation, maintenance and when necessary, dismantling. Delivery is ¾-in. B.S.P.T. and suction is 1-in. B.S.P.T., both taken from the end of the pump block.—*Joseph Evans & Sons (Wolverhampton) Ltd.*

Vacuum gauges

THE Instrumentation Division of Associated Electrical Industries Ltd. has completed the re-design of the Metrovac high vacuum gauges. The range includes ionisation, penning, pirani and thermocouple gauges covering the pressure range 10^{-9}mm to 1mm mercury.

The gauge heads for the new range are small, robust and demountable; they are metal-encased, and have been specially designed so that wearing parts can be replaced at little cost.

Each control unit gives a direct reading. The control equipment is compact and is mounted for ease of maintenance on a panel which slides into a portable pressed metal case. Alternatively, the unit can be mounted in Post Office type racks, a series of adaptor panels being available for this purpose.—*Associated Electrical Industries Ltd.*

Globe valve

THE Bestobell Two-Five-O was developed following a review of the current and anticipated needs of industry for a multi-purpose globe valve for all common factory services. Existing globe valves are designed with one basic closure device for a particular service, but the Two-Five-O offers six alternative trims (loose valves and seats) all quickly renewable or replaceable, to cover a whole range of factory services—air, steam, water, gas, at temperatures and pressures most frequently encountered, for control and stop purposes. The Two-Five-O provides low all-in cost of valving per year, with long life, minimum maintenance and reasonable first cost.—*Bells' Asbestos Engineering Ltd.*

Air filter

THE oil-wetted ferrule type air filter, introduced by the Visco Engineering Co. Ltd. in 1921, is still in great demand. Nevertheless, modern equipment requires modern air filters which are lighter to handle, easier to clean and still more efficient. With this end in view, a new development of the oil-wetted filter known as the Visco K.M. type air filter is now available.

A study has been made of the wide variety of metal media which could be used for air filtration and after extensive tests it was decided to use a medium of knitted galvanised wire mesh made from a flattened wire which gives greater surface area for dust retention. Also the layers of filter media are crimped in such a pattern as to induce extreme turbulence of the air passing through the filter cell, which results in greater impingment of the dust particles on to the oil-wetted surface.

The standard unit measures 20 in. by 20 in. and is approximately 2 in. deep and comprises a sheet metal frame enabling any number of unit to be bolted together to form a complete installation. The filter cell is of a channel section construction filled with filter medium which is retained between two sheets of flattened expanded metal. The cell is held in position in the frame by two quick release catches which are also the handles. By simply pushing the handles flat against the cell it is locked securely into the filter frame. It is therefore only a matter of seconds to take out or replace a filter cell.

In operating the plant under site conditions, it is usual to have a certain percentage of spare clean and oiled filter cells which can be placed in position quickly and easily, thus ensuring that the filter plant is out of commission for a few moments only:—*The Visco Engineering Co. Ltd.*

GAS JOURNAL

Readers' Enquiry Service

Details and coupons are given on the backing page

Hydraulic dumper

A NEW and improved concrete carrying body for the standard Muir-Hill 10B hydraulic dumper is announced by E. Boydell & Co. Ltd. The unit has been designed to carry concrete between batching plant and site and is particularly suitable for the feeding of pavers on road construction projects where the hauling distance is often too short to merit the use of agitators or mobile mixing plant.

The new concrete carrying body has a liquid capacity of 2 cu. yards when operating on a 1 in 10 gradient and, for this reason, the unit is ideal for use in conjunction with 1-yard continuous mixers.

The machine is arranged to provide a tipping height of 4 ft. 6 in. under the body lip—a height suitable for discharge into standard 1-yard and 2-yard concrete Transmie buckets and concrete pump hoppers. The tipping angle between the floor and the body mouth at maximum tip is 56°. A vibrator unit, supplied as an extra, may be fitted to the underside of the body mouth to facilitate slow discharge with the body partially tipped. For concrete placing and similar operations, a chute may be fitted to allow the concrete to be discharged at ground level.—*E. Boydell & Co. Ltd.*

Filter metal

A NEW filter material known as Porosint Rigimesh, is a woven wire mesh in various sizes of sheet which can be fashioned into a wide variety of shapes. The material has a strictly-controlled porosity, and its high strength and ductility enable it to be used where there is likelihood of sudden pressure surges, continuous vibration, and high-pressure drops in the liquid.

Rigimesh may be used in all types of existing filters and, owing to its resistance to corrosion and freedom from the breakaway of particles and fibres, it is particularly valuable in the laboratory. It way also be used for aerating units, breather vents, pressure snubbers, the protection of instrumentation in high temperature gas streams, thermal insulation at low temperatures and for use as a catalytic bed.—*Sintered Products Ltd.*

Readers' Enquiry Service

If you would like more information on products and services mentioned in the advertisement or editorial pages of the 'Gas Journal', fill in the coupons below, *one for each enquiry*, and send in unsealed envelope to **'Readers Enquiry Service', Gas Journal, 11 Bolt Court, Fleet Street, London, E.C.4.**

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NEWS SUPPLEMENT

Sales to industry soar, but

Mild winter causes another 1% slump in gas consumption

INCREASED sales of gas to industrial consumers in the October-December quarter were not sufficient to offset the fall in sales to domestic and commercial consumers. The weather was on average 2°F. warmer than in the same period last year, and total sales of gas fell by 1%. Sales for the nine months ended December, 1959, were 2% lower than for the same period of 1958.

Industrial sales increased with higher industrial activity and were 8% up in the October-December quarter and 4% higher for the nine months. Sales to domestic consumers and to commercial and other consumers fell by 4% and 5% respectively.

Revenue received, per therm of gas sold, remained unchanged at 21d. per therm.

MORE GAS BOUGHT

During the nine months there was a reduction of 8% in the manufacture of coal gas and of 9% in the quantity of coal carbonised. Water gas made showed a 1% reduction and total gas made was down by 5%. Purchases of surplus gas from coke ovens and oil refineries increased by 10%, but total gas available in the nine months was 2% lower than in the corresponding period of the previous year.

The production of coke for the nine months ended December was 10% lower, and sales of coke fell by 11%. Coke breeze production, unchanged in the December quarter, was 5% down on the nine months.

Crude tar made was more than 7% lower and the output of crude benzole was 3% down over the nine months.

APPLIANCE SALES

During the October-December quarter of 1958, hire-purchase restrictions were relaxed and compared with the high level of sales in that quarter, sales of gas cookers in 1959 were 8% down (17,600 lower). Over the nine months, April to December, 1959, cooker sales were 20% higher than last year.

Gas space heater sales were higher by 21,600 (23%) in the quarter and by 29% over the nine months. Sales of water heaters and refrigerators from April-December, 1959, were increased by 19% and 77% respectively, but wash-boiler and washing machine sales decreased by 21%.

New plant brought into use had a capacity of more than 45 mill. cu.ft. per day, of which just under a third was carbonising plant.

The net increase in mains laid in the nine months amounted to 1,403 miles, an increase of 7% over the corresponding period of 1958.

Between the end of January, 1959, and January, 1960, the number of persons employed in the gas industry fell by 5,300 to 128,254.

Central heating in commerce

THE wide range and the economical working of gas central heating systems in professional and commercial fields are emphasised in a new booklet issued by the Gas Council entitled 'Automatic Comfort for Customer and Staff.'

Examples of running costs in various districts, together with details of actual installations, are given in this booklet. These examples include offices, showrooms and a warehouse, an Oxford bookshop, banks, a hairdressing salon, an optician's premises, and departmental stores and other retail premises and offices.

Copies are obtainable from gas board showrooms.

POWELL DUFFRYN TO BUY HURSEAL LTD.

THE Board of Powell Duffryn Ltd. announce that a conditional offer which has been made for the purchase of the share capital of Hurseal Ltd., consisting of 160,000 ordinary shares of £1 each, at a price of 47s. 6d. per share, has been accepted in respect of the whole of the share capital.

The purchase of these shares by Powell Duffryn will accordingly take place under the terms of the offer.

Hurseal Ltd. and its wholly-owned subsidiary, Gulf Radiators Ltd., are manufacturers of a wide range of domestic and industrial central heating equipment.

The acquisition is, therefore, an important step in the development of Powell Duffryn's existing interests in the marketing of heating and air-conditioning equipment through Janitor Boilers Ltd. and Powell Duffryn Modulair Ltd., sole sales and service licensees in the United Kingdom for Dravo industrial space heaters and Tuttle & Bailey medium-pressure air distribution equipment.

The Board of Hurseal Ltd. has been reconstructed. Mr. Miles Reid, a Director of Powell Duffryn Ltd., has joined the Board as Chairman in succession to Mr. R. S. Bassett, who retires. Mr. O. Keir and Mr. B. W. Wade also retire.

Mr. W. H. Sharland, Deputy-Chairman of Powell Duffryn Ltd., and Mr. R. Turner, Managing Director of Powell Duffryn Technical Services Ltd, join the Board.

Mr. A. C. Hazel will continue as Managing Director.

Phenol price-fixing condemned

THE Restrictive Practices Court in London has declared the price-fixing agreement among members of the Phenol Producers' Association to be contrary to public interest. The Association has several area gas boards in their membership, the boards being the principal suppliers of the tar from which phenol and other chemicals are obtained.

Delivering the judgment, Mr. Justice Pearson said that in the view of the court, the rigidity of the fixed price and its ancillary terms and conditions was a disadvantage to purchasers. Some producers of synthetic phenol not in the Association were already making some sales below the fixed price. No sufficient evidence had been given of any world-wide oversupply of phenol, or of any difficulty of disposal of British-made phenol in the export market.

The court were of the opinion that the removal of the restrictions would not deny to the public any benefit or advantage. Mr. D. A. Grant, on behalf of the Association, gave an undertaking not to enforce the agreement.

Chairmen at trade fair

Chatting together at the Newport trade exhibition last week, our photo shows, from left: Mr. T. Mervyn Jones, Chairman of the Wales Gas Board; Mr. G. le B. Diamond, Chairman of the West Midlands Gas Board; and the Lord Mayor of Birmingham, Chairman of the Gas Consultative Council for the West Midlands area.

New plant brings Bangor gasworks bang up-to-date

WHEN new plant installed at a cost of £90,000 goes into operation in July next Bangor (Co. Down) gasworks will be the most up-to-date in Northern Ireland.

The provision of modern plant has had one notably fortunate result: Because of it an American cutlery manufacturing firm decided to establish a factory in the town. This firm, which will commence operations late in the present year, will use 17½% of the total gas manufactured.

Bangor gas at 8s. 4d. per 1,000 cu.ft. is relatively cheap, and this price has operated over the last three years. It is hoped to maintain it and to improve the calorific value of the gas when the new plant is in operation despite the heavy capital charges which have been incurred.

Industrial consumers will be charged only 6s. 4d. per 1,000 cu.ft.

In order to encourage central heating by gas a special domestic tariff has been introduced which provides for a standing charge of 19s. 6d. per quarter and gas at 6s. 4d. per 1,000 cu.ft., less 2½% discount.

Dublin strike threat

Most of Dublin Gas Company's 1,200 employees have voted in favour of strike action to support a salary claim by 130 clerical workers.

SIMON GROUPS —25% FINAL

SIMON-CARVES LTD., and Henry Simon (Holdings) Ltd. have recommended a final dividend of 25%, making 35% for the year.

Simon-Carves' group profit before tax for the year ended December 31 was £1,607,202, compared with £1,461,814 for the previous year.

Henry Simon made a group profit before tax of £1,274,935 (£1,206,321).

Statements put out by the companies say that the dividend recommendations are in anticipation of a proposed merger, following which, 'it would be the intention to distribute in dividend a higher proportion of the combined profits than either company had distributed in the past.'

Parliament

M.P. QUIZZES MINISTER ON SCOTTISH GAS

MR. E. G. WILLIS (Lab. Edinburgh E.) asked the Minister of Power in the Commons last week to state Scotland's share of total gas production in Great Britain in 1948 and in 1959.

He also asked to know the percentage increase or decrease in total gas output in Scotland between 1948 and 1959; and for a comparison between Scottish growth or decline over this period and that of the rest of Great Britain.

Mr. J. C. George, Parliamentary Secretary to the Ministry of Power, said: 'The Scottish share of total town gas available was 8.5% in 1948 and 7.4% in 1959. Town gas available at gasworks in Scotland in 1959 was 0.2% higher than in 1948 while gas available in the rest of the United Kingdom was 16% higher.'

Mr. Willis asked Mr. George if he was aware that 'his answer to these two questions once again shows that Scotland is falling very seriously behind the rest of the country in its industrial development?'

Mr. George: 'In fact, Scotland increased its share of industrial supplies of gas by 75%, compared with a 67% increase in the rest of Britain.'

Mr. W. Hannan (Lab., Maryhill) asked the Minister of Power for the percentage rise in the price of industrial coal, electricity, gas, fuel oil, and steel from 1949 until the latest convenient date, taking 1949 as 100 in each case.

Mr. Richard Wood, the Minister of Power: 'Approximate percentage increases from 1949 to 1959 are as follows: Coal 81%, electricity 33%, gas 70%, fuel oil 27%, and iron and steel 96%.'

Mr. Gerald Nabarro (C., Kidderminster) asked the Minister for comparative figures for 1959 and 1954 in respect of deaths and injuries caused by coal-gas poisoning.

Mr. George: 'The Gas Council estimates that there were 774 accidental deaths from coal gas poisoning in 1954 in Great Britain and (provisionally) 958 in 1959. I have no information about injuries.'

Industrial research in 1958 cost £3 mill.

BRITISH manufacturing industry spent £300 mill. on research and development in 1958, compared with £190 mill. in 1955.

Ninety-five per cent. of the £300 mill. was spent in industry's own establishments, and about 5% on payment to outside bodies such as co-operative research associations, universities and other public and private research institutions.

The main expenditure on research and development for the year under review was in aircraft (£100 mill.), electrical engineering (£64 mill.) and chemicals (£43 mill.).

These estimates are contained in a new D.S.I.R. survey on 'Industrial Research and Development Expenditure, 1958' (H.M.S.O., 1s. 5d., including postage).

CORRESPONDENCE

Is advertising everybody's business?

DEAR SIR,

I have enjoyed Mr. Teskey-King's criticisms of gas advertising, the wise but peppery comments they inspired in *Link-Up*, and your own excellent review of the situation.

But, you know, I don't really think anyone need spring to the defence of the professional advertising man. If he cannot survive the 'pinprick irritations' of popular criticism, if he does not accept that 'everyone knows better than the advertising specialist' as an occupational hazard, then his ulcers are already killing him or he should find quieter employment.

In my more optimistic moments I imagine I am an 'advertising specialist'; in more frustrating times I hope that my employer will fail to discover that I am not. Be that as it may, I would suggest that advertising is everybody's business. Why do we advertise? Surely to inform (when we feel pure and ethical about it!) and, above all, to sell. Now even an indifferent advertisement can sell—if it becomes everybody's business.

And everybody should make it their business, not to the end of criticising the drawing, or the type, or anything that is the result of the professional's work, but by making it their business:

(1) that every employee believes in the product being advertised;
(2) that the product advertised is on view to the public whenever the advertisement may be read;
(3) that attractive display emphasises the 'plus points' of the product and echoes the advertisement;
(4) that salesmen anticipate the advertisement, are briefed on how to sell the product, and know it as well as they know themselves;
(5) that sales literature is available;
(6) that stocks of the product are adequate to meet orders resulting from the advertisement without delay;
(7) that the installation team have the men and materials to cope if fixing or fitting is necessary;
(8) that *every employee* does his best by 'word of mouth' advertising to tell his friends, and even his enemies, about what his industry is advertising and how they can't possibly live without it.

There are even more 'thats' to be listed, but the point is that unless advertising is energetically exploited by the know-how of the sales force, supported by the enthusiasm of all non-selling employees, even a good advertisement is unlikely to enjoy much success.

Advertising is everybody's business because it is a built-in part of selling—and nobody in this industry can afford not to make that their business.

Don't worry about the health of the 'advertising specialists.' Support on the lines suggested is the best tonic for them. Anyway, they're indestructible.

Yours faithfully,
G. D. P.

April 8, 1960.

FORTHCOMING EVENTS

April 21.—EASTERN JUNIORS: Cambridge. Visit to gasworks and paper by B. Santo.

April 22.—NORTHERN JUNIORS: Newcastle-upon-Tyne. Special speaker meeting.

April 25.—EASTERN G.C.C.: Connaught Rooms, Great Queen Street, London, W.C.2. 2 p.m.

April 26.—INSTITUTION OF PLANT ENGINEERS: South Wales Engineers' Institute, Park Place, Cardiff. 'Heating and Air Treatment in Industry,' by A. A. Field.

April 26. — SOCIETY OF INSTRUMENT TECHNOLOGY, CONTROL SECTION: Manson House, 26, Portland Place, London, W.1. Annual general meeting and 'Some Recent Advances in Industrial Electrical Control Techniques,' by T. E. Barany. 6.15 p.m.

April 26.—MIDLAND JUNIORS: Birmingham. Annual general meeting followed by address by Dr. Mary Woodall.

April 27.—YORKSHIRE JUNIORS: Rotherham. President's Day. Visit to Car House works.

April 27. — MANCHESTER JUNIORS: Radiant House, Liverpool. 'An Investigation Into the Use of Gas for Drying and Pre-heating Foundry Ladles,' by K. G. Rhodes and G. Holmes.

April 28.—NORTH OF ENGLAND SECTION, I.G.E.: Three Tuns Hotel, Durham. Joint meeting with the Coke Oven Managers' Association, Northern Section. Paper on 'Centralised Control in a Modern Coke Oven Plant,' by M. D. Edington and H. Millner.

April 28. — LONDON AND SOUTHERN JUNIORS: Visit to Broom & Wade Ltd., High Wycombe.

April 28.—LONDON AND COUNTIES COKE SALES CIRCLE: Connaught Rooms, London. Brains trust on appliance testing. 2.30 p.m.

April 29.—SCOTTISH WESTERN JUNIORS: St. Enoch's Hotel, Glasgow. Annual general meeting.

April 29.—COKE OVEN MANAGERS' ASSOCIATION, SOUTHERN SECTION: Park Hotel, Park Place, Cardiff. 'Progress in Benzole Refining,' by T. Scott.

PERSONAL NOTES

DR. J. H. TOWLER has been appointed Chief Chemist of the North Eastern Gas Board. He was previously senior research chemist to the Joint Research Committee of the Gas Council and the University of Leeds.

MR. F. W. BRINKMAN, MR. R. S. HOPPER, and MR. S. SCHOFIELD have been appointed to the Board of Charrington Gardner Locket (London) Ltd.

OBITUARY

MR. FALCONER MOFFAT BIRKS, C.B.E., who was deputy-chairman of the North Thames Gas Board from 1949 to 1956, has died on his 75th birthday. Mr. Birks joined the Gas Light & Coke Company in 1921 as a mechanical engineer, and in 1935 he was appointed deputy chief engineer and in 1941 chief engineer. Four years later he became managing director. That same year, 1945, he was created C.B.E. He was deputy governor in 1946-49.

MR. ALASTAIR GRANT, who was a director of Alder & Mackay Ltd. until 1956, has died. He was a grandson of Mr. Alexander Mackay, who was the original and senior partner of Alder & Mackay. His father, Mr. William Grant, was a director and secretary of the company for many years.

MR. ERNEST JONES, who was for 38 years until his retirement seven years ago gas engineer at Stockport gasworks, has died.

Cooker campaign tops own record

FOUR-AND-A-QUARTER million pounds' worth of cookers were sold during a six weeks' co-ordinated sales campaign by the area gas boards which ended March 12.

The total of 122,000 cookers exceeded by more than 20% that of the previous year's campaign, which itself showed a 60% higher total than 1958.

IDEAL HOME SALES

MORE than 1,200 refrigerators were sold from the Gas Council's stands at the Ideal Home exhibition this year; this compares with 519 refrigerator sales last year.

Sales of 2,358 appliances on the stands brought in a total of £82,421. Most of the 2,600 enquiries are expected to lead to sales.

Particular interest was shown in central and warm air heating, 1,530 enquiries being received.

Apart from Gas Council sales 3,200 gas appliances were sold by manufacturers at the exhibition.

There's a *Lagonda* way to clean any tube

Lagonda tube cleaners are designed to remove all types of deposits from all types of tubes. The scraper head will clear tubes as small as ½" and upwards . . . drills from ⅞" up will break down the toughest deposit. Expanding brushes, and sectional brushes will leave tubes from ¾" up as clean as new. And for even smaller tubes, there is a wide assortment of drills and brushes.
The illustration (right) is only a partial listing of Lagonda equipment, but enough to indicate that the scope of the Lagonda range covers just about any tube you may need cleaned. If you have a tough tube cleaning job, write for the Lagonda Catalogue No. Y-48.

Lagonda TUBE CLEANERS made by Consolidated Pneumatic

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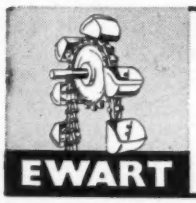
CP/185



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